

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

Claim 1 (Original) A method for producing a prosthesis, the method comprising at least partially cutting a material segment with a beam wherein the cutting is controlled by a process control unit to cut the material to correspond to a target image.

Claim 2. (Withdrawn) The method of claim 1 wherein the pattern is determined according to a preselected template.

Claim 3 (Withdrawn) The method of claim 1 wherein the material segment comprises a tissue segment separated from an organism.

Claim 4 (Withdrawn) The method of claim 3 wherein the tissue segment comprises a tissue sheet.

Claim 5 (Withdrawn) The method of claim 1 wherein the material segment comprises a polymer.

Claim 6 (Original) The method of claim 1 wherein the target image has a leaflet section.

Claim 7 (Original) The method of claim 1 wherein the target image is determined by

- a) forming a digital image of the material segment;
- b) comparing the digital image to a target image to evaluate the difference between the digital image and the target image; and
- c) determining a cutting pattern based on the difference.

Claim 8 (Original) The method of claim 7 wherein the digital image is formed using a video camera.

Claim 9. (Withdrawn) The method of claim 7 wherein the digital image is formed by a scanning phase measurement.

Claim 10 (Original) The method of claim 7 wherein determining the cutting pattern involves forming the cutting pattern based on the border between the digital image and the target image.

Claim 11 (Original) The method of claim 7 wherein the cutting pattern is selected to avoid cutting any material that forms a portion of the target object.

Claim 12 (Original) The method of claim 7 further comprising orienting the digital image relative to the target image prior to comparing the digital image with the target image.

Claim 13 (Withdrawn) The method of claim 1 wherein the beam comprises a laser beam, and wherein the laser beam passes through frequency shifting optics.

Claim 14 (Withdrawn) The method of claim 1 wherein the beam comprises infrared laser light.

Claim 15 (Withdrawn) The method of claim 1 wherein the beam comprises visible laser light.

Claim 16 (Withdrawn) The method of claim 1 wherein the beam comprises ultraviolet laser light.

Claim 17 (Withdrawn) The method of claim 1 wherein the beam comprises a fluid.

Claim 18. (Withdrawn) The method of claim 1 wherein the cutting comprises moving beam directing optics to an appropriate location to direct the beam to the selected position on the material segment.

Claim 19. (Withdrawn) The method of claim 1 wherein the cutting comprises moving a support platform supporting the material to direct the light to a selected portion of the tissue.

Claim 20 (Withdrawn) The method of claim 1 wherein the at least partially cutting comprises partially cutting the material segment.

Claim 21 (Withdrawn) The method of claim 1 wherein the at least partially cutting comprises complete cutting of the material segment.

Claim 22. (Withdrawn) The method of claim 1 wherein the process control unit comprises a digital processor.

Claim 23 (Withdrawn) The method of claim 1 further comprising assembling cut components to form a prosthesis.

Claim 24 (Withdrawn) An apparatus for cutting a tissue segment, the apparatus comprising:

- a) a tissue segment;
- b) a support platform supporting the tissue segment;
- c) a beam generator oriented to direct a beam at the tissue segment; and
- d) a process control unit that controls the relative position of the support platform and the beam.

Claim 25 (Withdrawn) The apparatus of claim 24 further comprising a motor that changes the relative position of the support platform and the beam.

Claim 26 (Withdrawn) The apparatus of claim 25 wherein the process control unit actuates the motor to adjust the relative position of the support platform and the beam.

Claim 27 (Withdrawn) The apparatus of claim 25 wherein the motor is operably connected to the support platform to move the support platform relative to the beam.

Claim 28 (Withdrawn) The apparatus of claim 25 wherein the process control unit comprises a digital processor operably connected to the motor, wherein the processor controls the motor based on a target image.

Claim 29. (Withdrawn) The apparatus of claim 25 wherein the process control unit comprises a manual control that controls the actuation of the motor.

Claim 30 (Withdrawn) The apparatus of claim 24 wherein the support platform comprises a flat surface contacting the tissue.

Claim 31. (Withdrawn) The apparatus of claim 24 wherein the support platform comprises a mandrel supporting the tissue segment.

Claim 32 (Withdrawn) The apparatus of claim 31 wherein the mandrel is cylindrical or tapered.

Claim 33 (Withdrawn) The apparatus of claim 24 further comprising optical elements within the beam generated by the beam source to redirect the beam, and wherein the process control unit is operably connected to the optical components to move the optical components relative to the support platform.

Claim 34 (Withdrawn) The apparatus of claim 24 wherein the support platform comprises a fluidized bed.

Claim 35 (Withdrawn) The apparatus of claim 24 wherein the support platform comprises a vacuum fixture.

Claim 36 (Withdrawn) The apparatus of claim 24 further comprising a imaging device comprising a detector, wherein the imaging device is connected to the process control unit to form a digital image of the tissue segment.

Claim 37 (Withdrawn) The apparatus of claim 36 wherein the imaging device comprises a digital video camera.

Claim 38 (Withdrawn) The apparatus of claim 24 wherein the tissue segment comprises a heart valve explant with intact leaflets.

Claim 39 (Withdrawn) The apparatus of claim 24 wherein the tissue segment comprises a tissue sheet.

Claim 40 (Withdrawn) The apparatus of claim 39 wherein the tissue sheet has a film of water covering the tissue.

Claim 41 (Withdrawn) The apparatus of claim 24 wherein the beam source comprises a laser.

Claim 42 (Withdrawn) The apparatus of claim 24 further comprising beam directing optics mounted on a motorized stand, such that movement of the motorized stand alters the position of the beam on the tissue segment.

Claim 43 (Withdrawn) The apparatus of claim 24 wherein the beam source comprises a fluid jet.

Claim 44. (Withdrawn) The apparatus of claim 24 further comprising a humidity control to maintain high humidity in the environment surrounding the tissue.

Claim 45 (Withdrawn) A heart valve prosthesis comprising a tissue segment separated from the host, the tissue having a cauterized edge.

Claim 46 (Withdrawn) A method of cutting a tissue sheet to remove portions of the tissue sheet having different thicknesses, the method comprising:

imaging the tissue sheet on a smooth surface to evaluate the thickness of the tissue sheet at different points; and cutting the tissue sheet to separate portions of the tissue sheet with a thickness outside of a selected range.

Claim 47 (Withdrawn) The method of claim 46 wherein the tissue sheet is mounted on a flat support platform that serves as a calibration reference point.

Claim 48 (Withdrawn) The method of claim 46 wherein the tissue sheet is mounted on a mandrel.

Claim 49 (Original) The method of claim 46 wherein the imaging is performed with a laser and a detector.

Claim 50 (New) The method of claim 1 wherein said target image comprises a pericardial patch.

Claim 51 (New) The method of claim 1 wherein said target image comprises chordae.

Claim 52 (New) The method of claim 46 wherein said cutting is controlled by a process control unit.

Claim 53 (New) The method of claim 46 wherein said selected range is provided by a target image.

Claim 54 (New) The method of claim 53 wherein said target image comprises a leaflet section.

Claim 55 (New) The method of claim 53 wherein said target image comprises a pericardial patch.

Claim 56 (New) The method of claim 53 wherein said target image comprises chordae.

Claim 57 (New) The method of claim 46 wherein the imaging of the tissue sheet produces a digital image.

Claim 58 (New) The method of claim 53 wherein the selected range is determined based on the border between the digital image and the target image.

Claim 59 (New) The method of claim 53 wherein the selected range is selected to avoid cutting any material that forms a portion of the target object.

Claim 60 (New) The method of claim 57 further comprising orienting the digital image relative to the target image prior to comparing the digital image with the target image.